

Dean

Dean Equipment

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- Fryer Serial Numbers
- Model Number Identification
- Model Prefixes



Dean 22424.

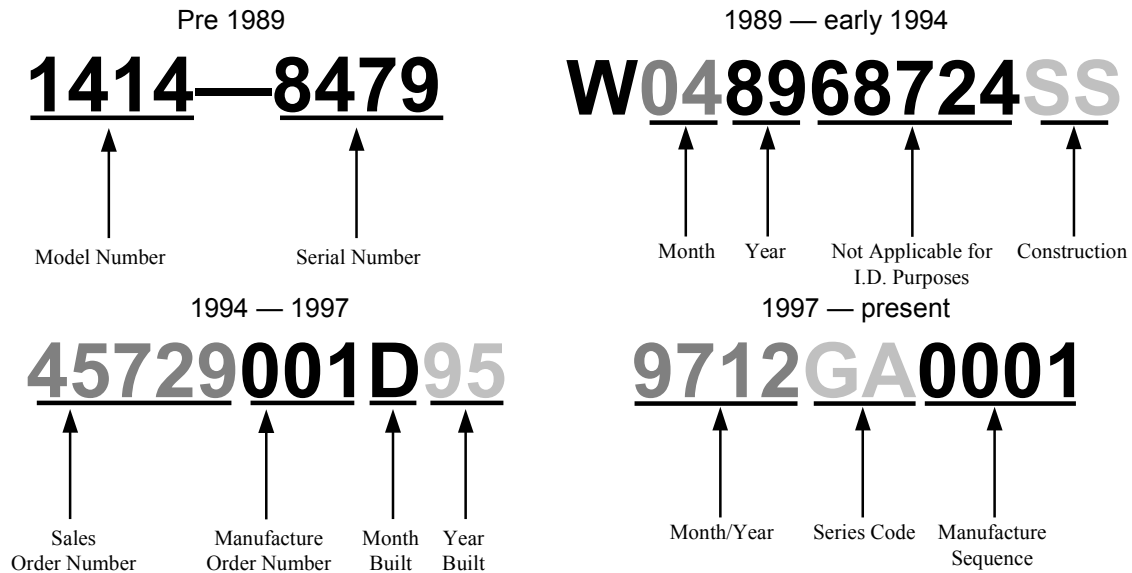


Dean D450.

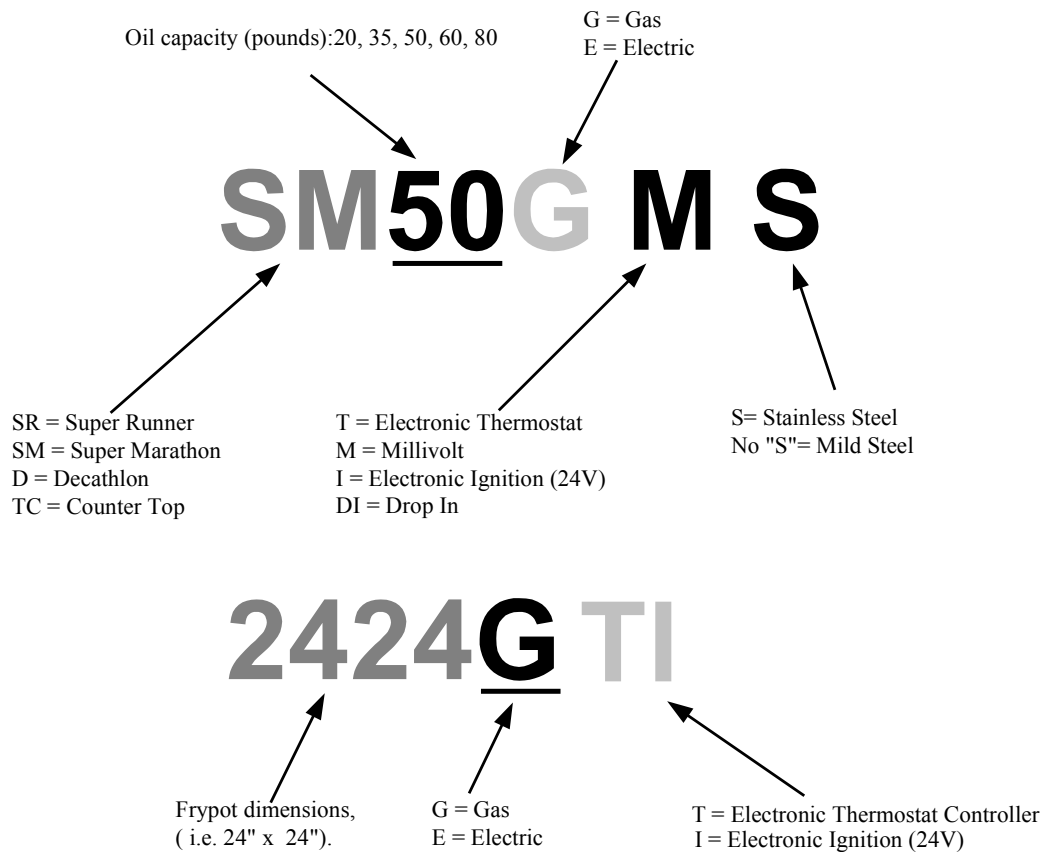
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Dean Fryer Serial Numbers



Model Number Identification



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Dean Model Prefixes

(SR) Super Runner	Single fryers only; no filter; millivolt only; no basket lifts.
(SM) Super Marathon	Can be single or multiple fryers; optional built-in filtration; usually millivolt; optionally equipped with basket lifts.
(D) Decathlon	Can be single or multiple fryers; optionally equipped with electronic controls (Thermatron or computer); optional built-in filtration; optionally equipped with basket lifts.
(TC) Triathlon	Countertop fryer; millivolt only.

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Millivolt Fryers

Super Runner, Super Marathon & Triathlon

- General Information
- Components
- Troubleshooting



Super Runner
42 Gas Fryer.



Triathlon TC-25
Millivolt Fryer.

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General Information

The most basic of the Dean fryers are millivolt-operated and thermostat-controlled models. The Super Runner (SR) and Super Marathon (SM) models are essentially alike in operation, with the primary difference being oil capacity and physical size. The table below covers current production units (SR38G fryer production was discontinued in May 2002).

MODEL	OIL CAPACITY	BTU.	FRYING AREA	# of Tubes
D/SM20G	20-23 lb.	50,000	6 ½" x 14"	2
D/SM35(40)G	35-43 lb.	90,000	14" x 14"	3
D/SM50G	35-50 lb.	115,000	14" x 14"	4
D/SM60G	60-75 lb.	150,000	18" x 18"	5
D/SM80G	80-100 lb.	165,000	20" x 20"	5
SR42G	35-43 lb.	105,000	14" x 14"	3
SR52G	35-50 lb.	120,000	14" x 14"	4
SR62G				5

The Dean line of countertop fryers consists of two fryers, the TC25 and TC35. The models are very similar in appearance and in operation. The TC35 has five burner tubes, and the TC25 has four burner tubes. Both are millivolt fryers. TC35 fryer production was discontinued in May 2002.

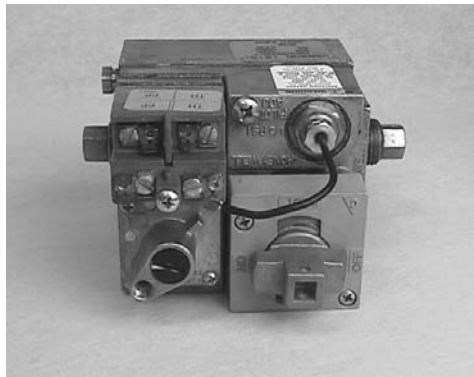
MODEL	OIL CAPACITY	BTU.	FRYING AREA	COMMENTS
TC25	25 lb.	72,000	12.5" x 14"	Millivolt- 4 Burners

Components

Gas Valves

Millivolt units are equipped with a Robertshaw or Honeywell gas valve. Both valves are powered by a thermopile (or pilot generator) and do not require an external electrical source to operate. The thermopile is also part of the pilot safety circuit.

Beginning in March 1994, the Honeywell millivolt gas valve was phased into the Super Marathon Fryer line. Some units (i.e. SM20G) may still incorporate a Robertshaw gas valve. The SR38G fryer was manufactured with the Honeywell gas valve from its inception, up until discontinued in May 2002.



Honeywell Millivolt Gas-valve



Robertshaw Millivolt Gas-valve

Pilot Assembly

The pilot assembly consists of a pilot orifice, pilot hood, thermopile and mounting bracket.

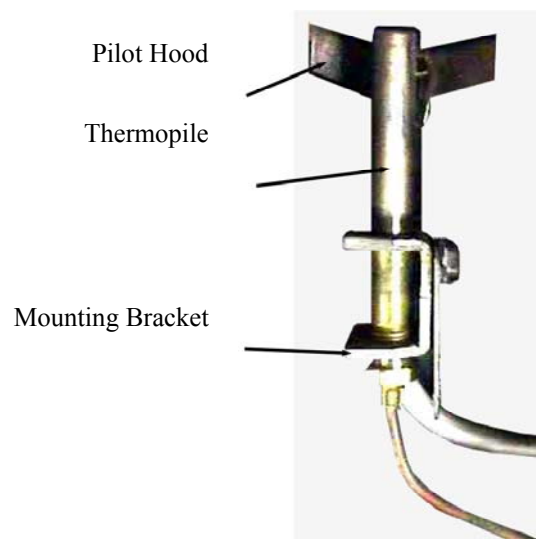
The pilot serves two functions:

1. Lights the main burners and
2. Heats thermopile

Thermopile

Dean's thermopiles are rated at 750 millivolts. Minimum output unloaded (disconnected): 500 mV. Minimum output loaded (pilot lit, thermostat off): 200 mV.

1 mV = 1/1000 of 1 Volt



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Operating Thermostats

The Sunne operating thermostats used in Dean fryers are accurate to within approximately +10 to -20°F. The manual thermostat operates in a range of 200- 400°F and is used in all Dean millivolt fryers; it is optional on Decathlon-series fryers.

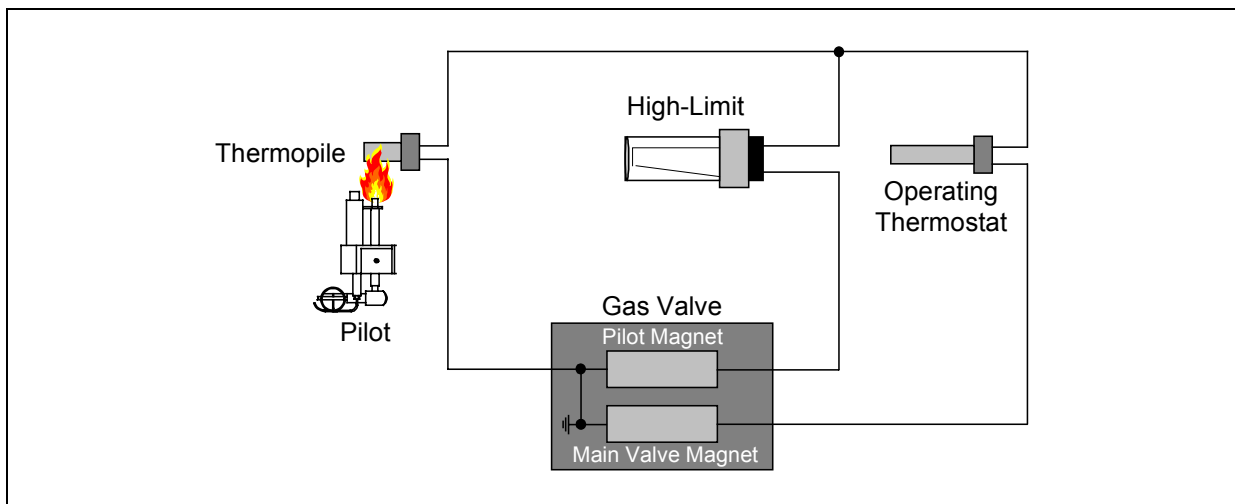


High-Limit

Operating-Thermostat

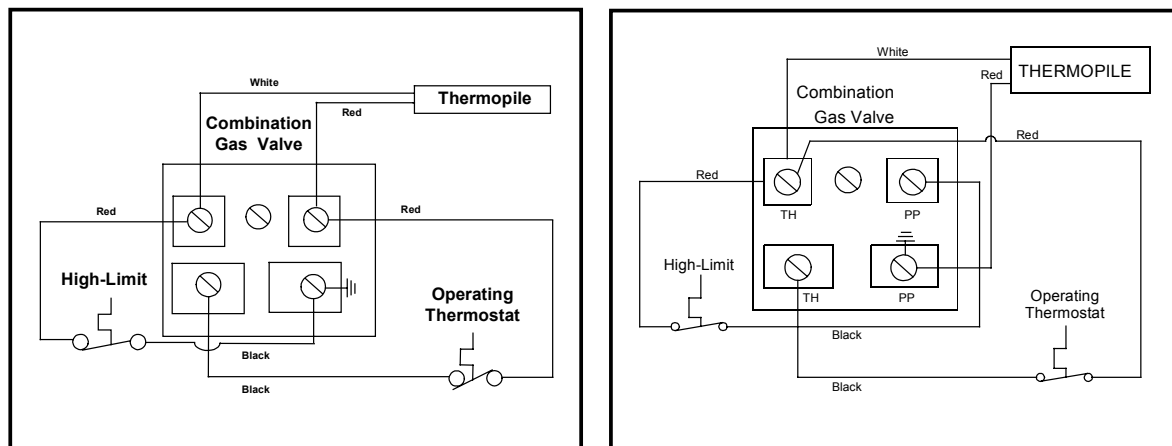
High-Limit Thermostats

The high-limit thermostat acts as a safety switch to protect from extremely high oil temperatures. If the oil temperature exceeds the manufacturer's pre-set temperature of 425-450°F, the high-limit will open and disable the gas valve. The high-limit thermostat has a manual reset for safety.



Millivolt Circuit: Functional Diagram

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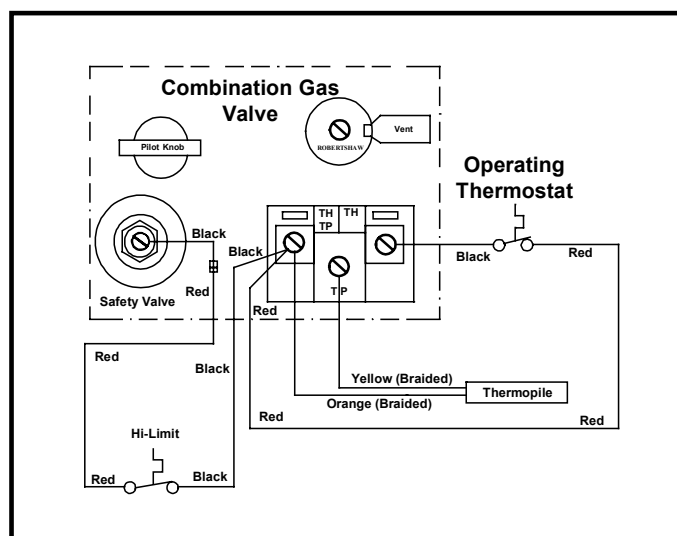


The early arrangement of Honeywell millivolt wiring is shown on the left above. The current wiring is shown on the right.

Although different in wiring and appearance, both types of gas valves operate similarly in their function.

It is also important to note that older **Dean** fryers (fryers built prior to May 2002) using Honeywell millivolt gas valves were wired differently than **Frymaster** Honeywell millivolt gas valves. Although the valves are similar in appearance, the two systems will not work properly unless the correct wiring schematics are followed.

Current production Dean fryers (fryers built after May 2002) are wired the same as **Frymaster** Honeywell millivolt gas valves (see illustration below). Robertshaw millivolt gas-valve wiring remains unchanged.



Robertshaw Millivolt Gas Valve Wiring

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Cool Zone Fryers

Decathlon (D20, D50, D60 D80)

- General Information
- Components
- Troubleshooting



Dean D460

General Information

Dean Decathlon gas fryers are manufactured in a variety of different sizes and capacities. There are also significant differences in ignition and control systems. The Decathlon Cool Zone fryers are tube-type fryers, and may incorporate many combinations of multiple-fryer options (possibly different models in the same battery), automatic basket lifts, and built-in oil filtration systems.

Components

Temperature Control Systems

- Basic operating-thermostat
- Thermatron Controller
- Thermatron primary with optional operating-thermostat backup
- Computer (either **Dean/Frymaster** or **Fast** computer)
- Computer with either electronic or operating thermostat backup

Ignition System

- Standing pilot with 120-volt gas valve
- 24-volt electronic ignition (Pilot lights first, then main burners light after the pilot flame is proved.)
- Standing pilot with electronic ignition

Gas Pressure

Dean Decathlon fryers require incoming gas pressure in the range of 6-14" WC for natural gas, and 10-14" WC for LP. For natural gas, the valve supplies 4" WC to the burners. For LP (including butane and butane mixtures) the valve is set at 10" WC to the burners. *These are normal settings. Verify all pressures with data plate.*

The burner flame should be a rich, blue color, turning yellow/orange as it goes through the diffusers in each burner tube.

Burners

The burners, which are similar in appearance in a given model, are actually manufactured as either left, right or center versions. For example, a D20 will have a left and a right burner. A D60 with five burners will have a left burner, three center burners and a right burner. It is essential that the burners be installed in the correct location. If more than one is removed at a time, they should be marked appropriately for re-installation. Failure to install the burners correctly will result in some burners failing to light properly, or not at all.

Electronic Ignition

The ignitor for the 24-volt ignition differs from the standard pilot assembly. A flame-sense rod replaces the thermopile in electronic ignition assemblies.

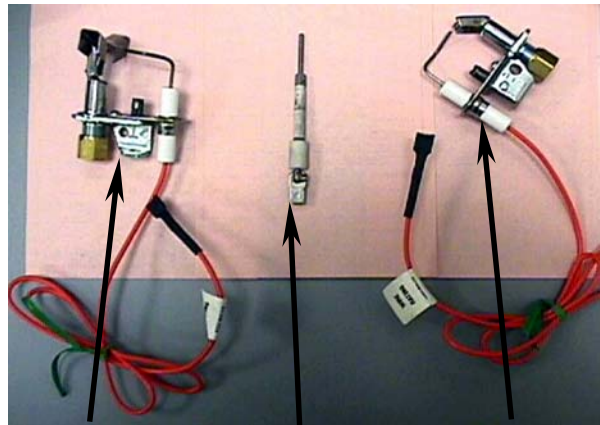
Thermatron System

A Thermatron System incorporates a temperature probe, a potentiometer, and a temperature control circuit board. This system is more accurate and more reliable than a standard thermostat.

- The temperature probe measures oil temperature via resistance (ohms). As the oil temperature increases, the resistance decreases.
- The potentiometer sets the oil operating temperature via resistance (ohms).
- The temperature control circuit board compares the resistance from the probe and potentiometer and cycles the burner on and off as necessary.



Thermatron Probes: hi-limit on the left and temperature on the right.

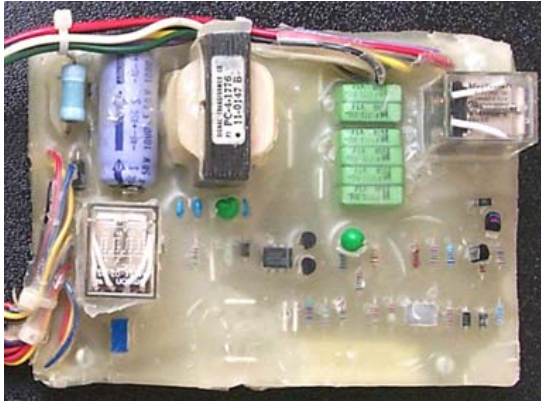


Cool Zone
Ignitor

Cool Zone
Flame-Sense
Rod

D20 Pilot
Assembly

Dean

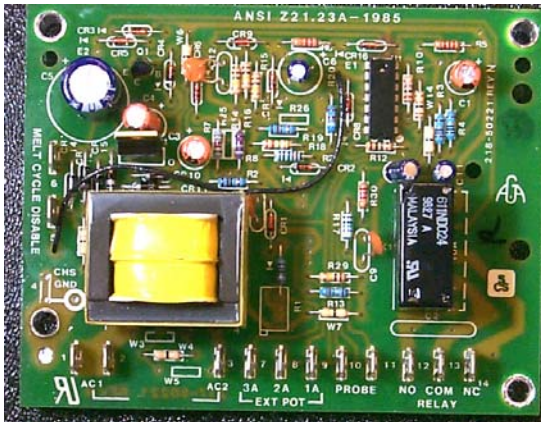


Old-style Thermatron board.



Old-style Thermatron control panel.

The old-style Thermatron system (discontinued in 1989) can be easily identified by a push-button test switch on the control panel (probe test button). The probe wires, one black and one white wire, are also indicators of old-style systems (current systems have two black or two brown wires). A replacement temperature-sensor probe is available for old-style systems, but the interface board is not. If the old-style interface board fails, the complete system must be retrofitted with the current-style Thermatron system.



Current-style Thermatron board.



Current-style Thermatron control panel.

The current-style Thermatron system can be identified by the absence of a test button on the controller. Also, both wires connected to the probe are either dark brown or black. **None of the parts for the two systems are interchangeable.** The temperature/resistance characteristics are very different for each probe and the corresponding circuit board.

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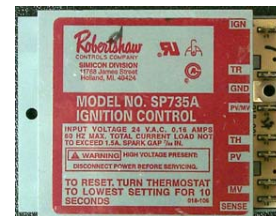
Computer System

Some Cool Zone series fryers use a computer control system. It replaces the Thermatron controller and functions similarly while adding cook cycle timing and temperature/timing sensitivity. The computer temperature probe looks similar to the Thermatron probe, but it has a red and white lead. This temperature probe functions in the same way as the **Frymaster** probe: as oil temperature increases, so does the resistance measured by the probe.

Electronic Ignition

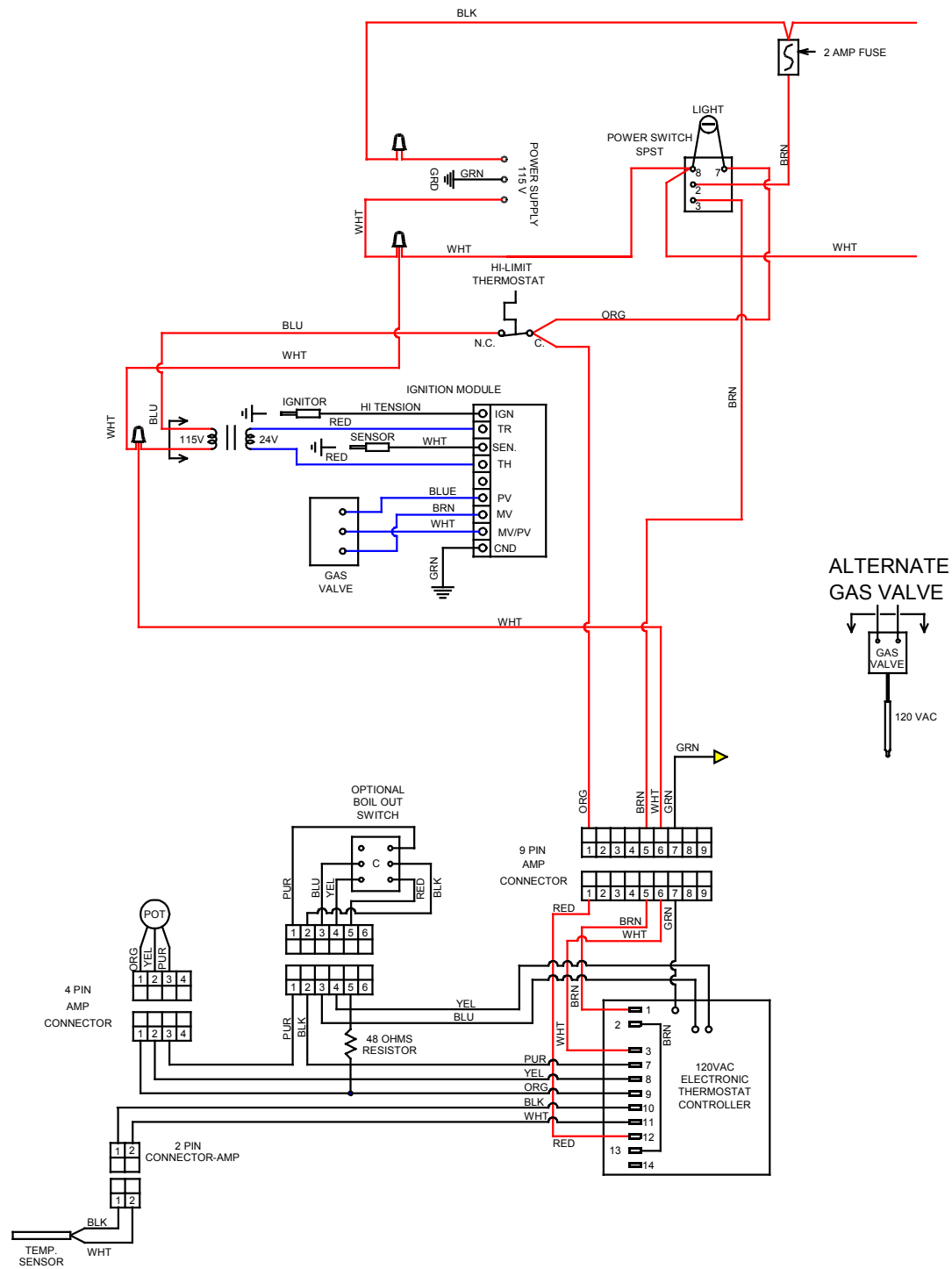
Dean electronic ignition fryers incorporate a variety of ignition modules. Decathlon fryers have been manufactured with Robertshaw ignition modules, which sense flame through a separate flame-sensing wire. The Honeywell module senses flame through the high-voltage wire.

Either of these Robertshaw modules is acceptable for use in Decathlon fryer systems.

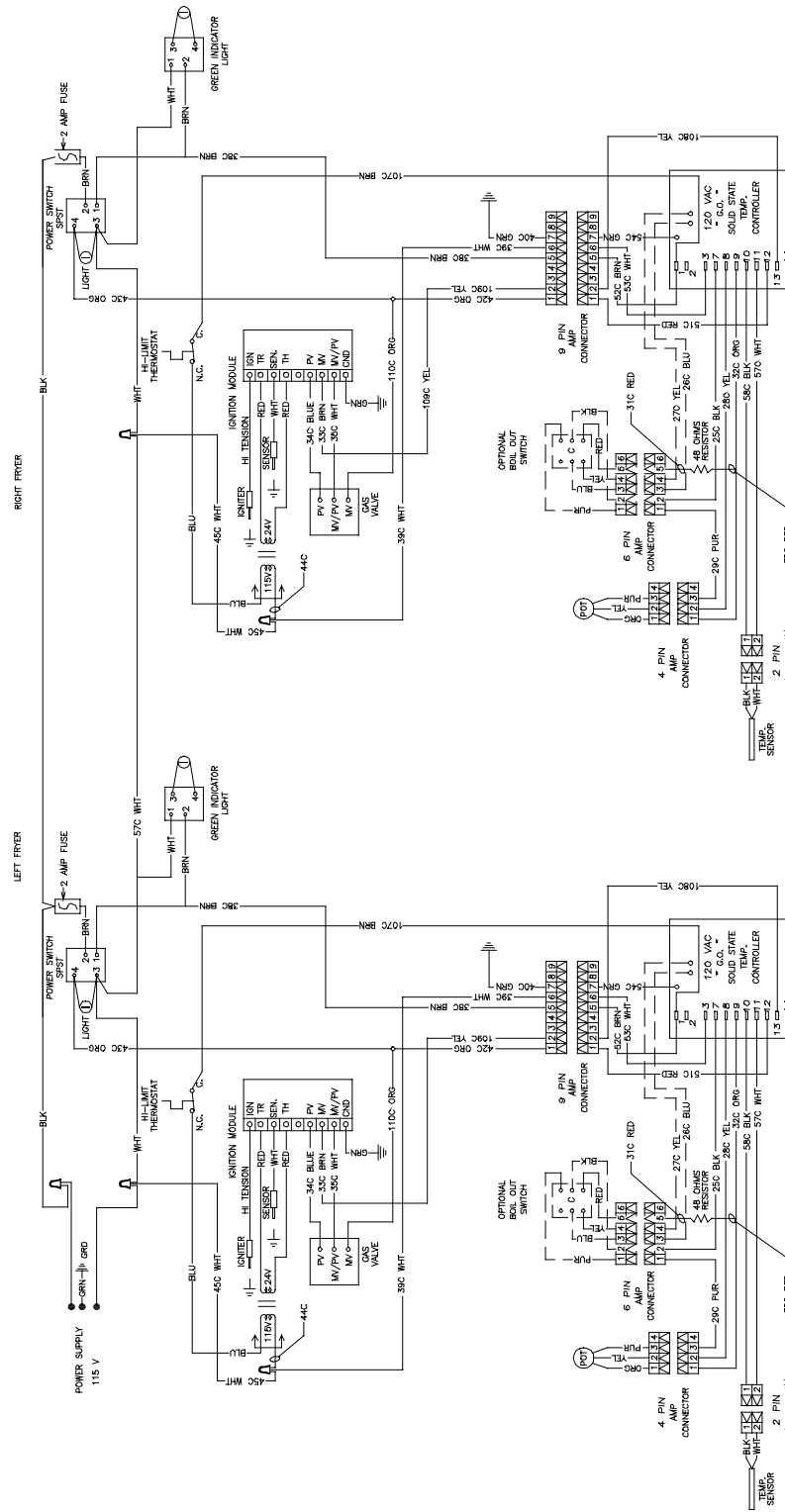


The modules above are examples of the "dual-stage" ignition module. An electronic spark lights the pilot, then the main valve opens after the pilot flame is "proved". The Robertshaw dual-stage ignition module is currently the only module used.

Wiring Diagram: Decathlon with Current Thermatron Controls



Wiring Diagram: Decathlon with Thermatron Controls and Standing Pilot Electronic Ignition



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Dean Thermatron Probe Resistance Charts

Below are resistance charts applicable to Dean fryers equipped with Thermatron controllers. Old-style Thermatron resistance values are included to troubleshoot systems built prior to 1990. Current-style Thermatron resistance values are included to troubleshoot systems built after 1990 through current production.

Old-Style Thermatron Systems (Probe wire color: One Black Wire; One White Wire)			Current-Style Thermatron Systems (Probe wire color: Two Black Wires or Two Brown Wires)		
° Celsius	° Fahrenheit	Ohms (± 3%)	° Celsius	° Fahrenheit	Ohms (± 3%)
21	70	110	21	70	108130
27	80	113	27	80	84606
32	90	115	32	90	66721
38	100	118	38	100	53020
43	110	121	43	110	42452
49	120	123	49	120	34206
54	130	126	54	130	27735
60	140	129	60	140	22641
66	150	132	66	150	18588
71	160	135	71	160	15349
77	170	138	77	170	12741
82	180	141	82	180	10635
88	190	144	88	190	8925
93	200	147	93	200	7527
99	210	150	99	210	6391
104	220	153	104	220	5470
110	230	156	110	230	4705
116	240	159	116	240	4030
121	250	163	121	250	3441
127	260	166	127	260	2967
132	270	169	132	270	2583
138	280	172	138	280	2255
143	290	176	143	290	1977
149	300	179	149	300	1729
154	310	183	154	310	1496
160	320	186	160	320	1320
166	330	189	166	330	1170
171	340	193	171	340	1051
177	350	196	177	350	942
182	360	200	182	360	840
188	370	204	188	370	750
193	380	207	193	380	676
199	390	211	199	390	605
204	400	215	204	400	541

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Flatbottom Fryers

1824G, 2424G

- General Information
- Components
- Troubleshooting



Dean 2424 Flatbottom gas fryer.

General Information

MODEL	OIL CAPACITY	BTU	FRYING AREA	CONTROLS
1824G (T)	45-70 lb.	120,000	18" x 24"	Operating Thermostat or Thermatron
2424G (T)	65-90 lb.	120,000	24" x 24"	Operating Thermostat or Thermatron

Dean Flatbottom fryers incorporate blowers to move combustion air over the burners. The blower is mounted in the exhaust flue area and operates by pulling air over the burners, which directs the combustion products back and forth across the underside of the frypot, through a series of baffles, thus facilitating even heat transfer.

Temperature Control Options

- Thermatron controller.

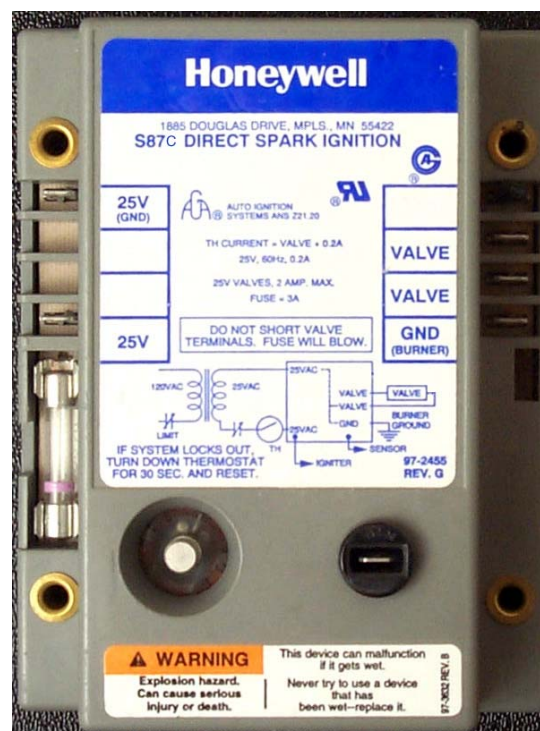
Ignition System Options

- Standing pilot with 120VAC gas valve.
- Direct spark ignition with 24VAC gas valve.



Direct spark ignitors.

Flatbottoms with direct spark ignition use a Honeywell spark module. **NOTE:** *The alarm terminal is not used. Previous modules had no alarm terminal.*



Honeywell direct-spark ignition module

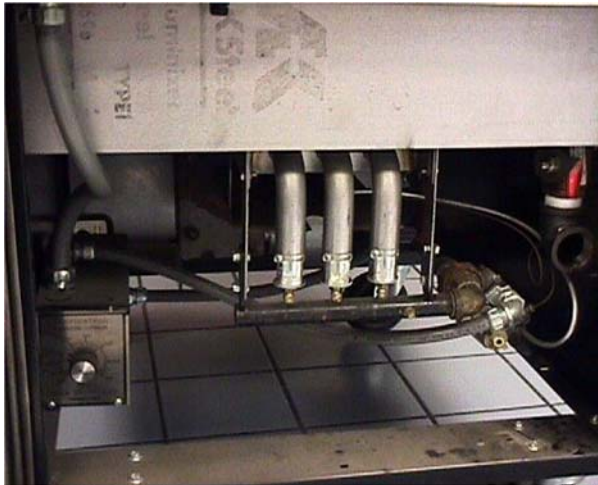
Components

Gas Valves

Flatbottom fryers may use either a Robertshaw or Honeywell gas valve. Normally, the 120VAC version uses a Robertshaw valve, and the 24VAC electronic ignition version uses a Honeywell valve.

Burners

Dean flatbottom fryers each have three burner tubes, which go into a single burner/heat diffuser area under the frypot. The flame is drawn by the blower through the diffuser/baffle area where the heat is transferred to the bottom of the frypot, thus heating the oil.



Front View of Burner Area.



Front Oil Drain

Flame Baffles

Blower Assembly

The blower is a line voltage AC motor activated when the temperature control calls for heat. Once the blower generates sufficient airflow the sail switch closes, providing power to the module and gas valve.



The 2424's sail switch is accessible through a panel on the rear of the blower housing.



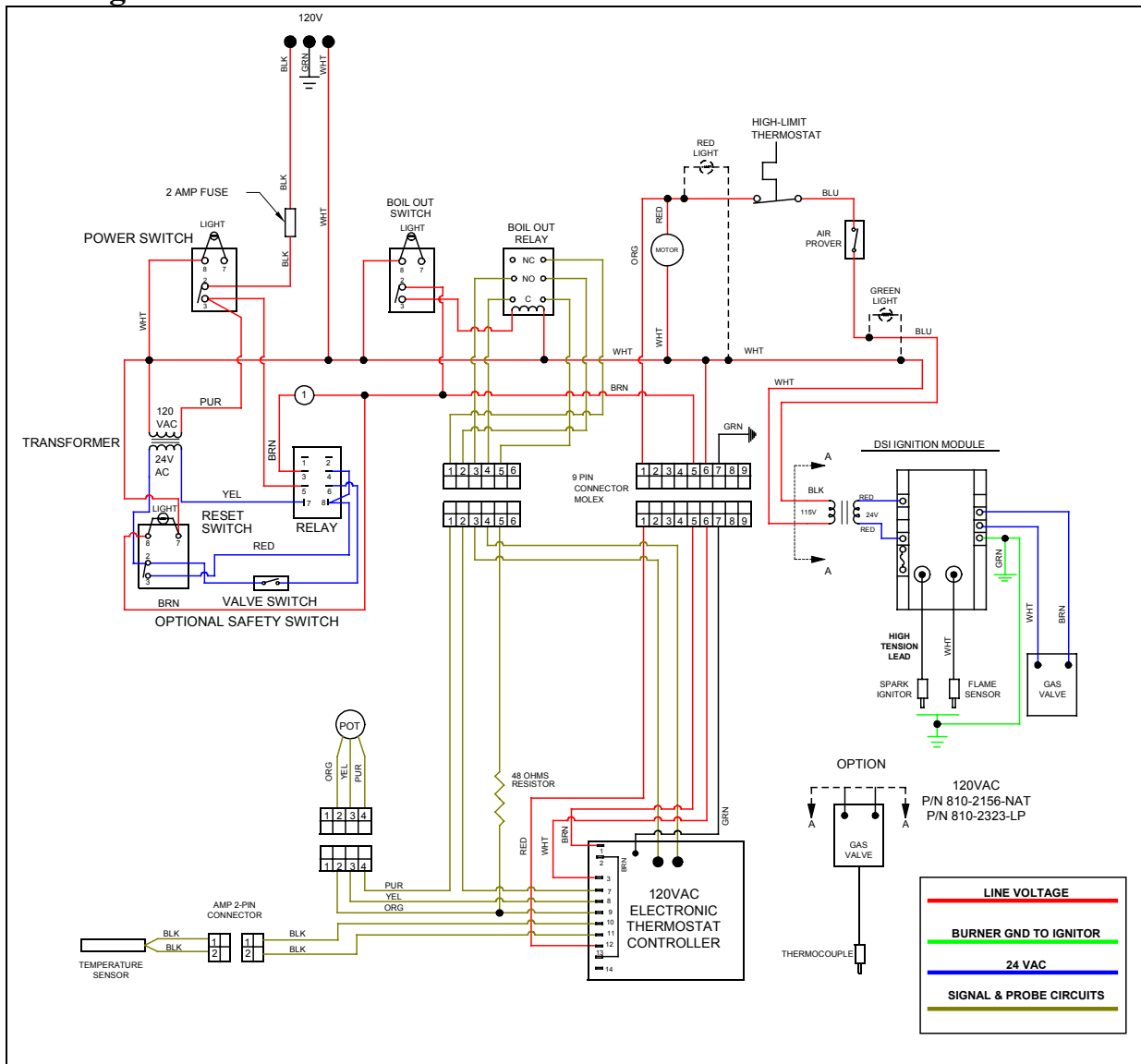
The burner box on the flatbottom is insulated.

Temperature Control Systems

The Thermatron controller system is the standard temperature-control system and may be used with either the standard 120VAC-gas valve or 24VAC electronic ignition. See the Decathlon Fryers section for a detailed description of the Thermatron controller system.

The standard Robertshaw or Sunne operating-thermostat and the high-limit thermostat used in these fryers are the same components used in the Super Marathon millivolt fryers. In Dean Flatbottom fryers, the high-limit thermostat is wired in series with the gas valve main coil in a 120VAC system or on the primary side of the 120/24VAC transformer in a 24VAC ignition system. When the high-limit switch opens, the gas valve or the 24VAC transformer loses power and shuts off the main burners.

Wiring Schematic



In the 24VAC electric-ignition models, 120VAC from the control circuit passes through the sail switch, the high-limit thermostat, and the 120/24VAC transformer to the spark module. The module opens the gas control valve and causes the ignitor to spark for a predetermined time. The Thermatron controller or the operating-thermostat controls the system as long as the flame sensor detects the flame.

In the 120VAC models, a similar power flow occurs. The main difference, other than the standing pilot, is that the control circuit voltage energizes the 120VAC gas-valve main-coil directly after passing through the blower, the sail-switch, and the high-limit thermostat.

The Dean Flatbottom fryers may be controlled in a variety of ways. Because models 2424G and 1824G look almost the same in any configuration, it is essential to determine the type of ignition and temperature control system for proper troubleshooting and repair.